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SUGAR PRICES FOR MONTH ENDING FEBRUARY 12, 1909.

	Centrifugals	Beets	Parity
January 12	3.74¢	10s. 2¼d.	4.15¢
" 13	3.73¢	10s. 2¼d.	4.15¢
" 14	3.73¢	10s. 2¼d.	4.15¢
" 15	3.71¢	10s. 2¼d.	4.15¢
" 16	3.71¢	10s. 1½d.	4.14¢
" 18	3.685¢	10s. 0¾d.	4.12¢
" 19	3.67¢	10s. 1½d.	4.14¢
" 20	3.67¢	10s. 1½d.	4.14¢
" 21	3.67¢	10s. 1½d.	4.14¢
" 22	3.73¢	10s. 3d.	4.16¢
" 23	3.73¢	10s. 3d.	4.16¢
" 25	3.70¢	10s. 2¼d.	4.15¢
" 26	3.70¢	10s. 1½d.	4.14¢
" 27	3.67¢	10s. 1½d.	4.14¢
" 28	3.67¢	10s. 0¾d.	4.12¢
" 29	3.67¢	10s. 2¼d.	4.15¢
" 30	3.67¢	10s. 1½d.	4.14¢
February 1	3.67¢	10s. 1½d.	4.14¢
" 2	3.67¢	10s. 1½d.	4.14¢
" 3	3.64¢	10s.	4.11¢
" 4	3.64¢	10s.	4.11¢
" 5	3.64¢	10s.	4.11¢
" 6	3.64¢	10s.	4.11¢
" 8	3.61¢	10s. 0¾d.	4.12¢
" 9	3.61¢	10s.	4.11¢
" 10	3.61¢	10s.	4.11¢
" 11	3.61¢	10s.	4.11¢

In their "Weekly Statistical" of January 21, Willett & Gray state:

Raws.—The market remained unchanged and comparatively dull on the basis of 3.73c. per lb. for 96 test Centrifugals until near the close of the week under review when pressure to sell from both Cuba and Porto Rico caused a decline to the basis of 3.67c. landed or 2 5-16c. c. & f. for Cubas 96 test, for January and early February shipments. The decline, however, appears to be checked at this price inasmuch as the British markets continue to be held firm and even show some improvement, so that a further decline of 1-16c. to 2¼c. c. & f. might open the British markets to shipments from Cuba, a contingency that U. S. buyers would hardly appreciate favorably. Therefore, it would seem that it can be stated with a fair show of confidence that the Cuban market is at or near its lowest level for the season and that, when a sufficient quantity of new crop sugars have been placed to relieve the pressing necessities of the early production, the regular anticipated moderate improvement in the situation may be expected to follow. In fact, at the close, with Europe recovered from its slight depression and inactivity, as noted in today's cables, there are fewer offers to sell from Cuba at the 2 5-16c. c. & f. basis.

Porto Rico may, however, be a factor to consider soon, with its increased offerings as the crop proceeds but, at the moment, sellers thence require full parity of Cuba Centrifugals.

It must be kept in mind, further, that Cuban sugars are now 48c. per 100 pounds below parity of European beet sugars, which is a strong feature in connection with any expected change and should at some time prove a buying motive for both refiners and speculators; cane sugars in Europe, however, are now 8c. per 100 pounds relatively lower than beet sugars, compared with this time last year.

Sales of San Domingo sugars have been recently made to the United Kingdom at 2¼c. c. f. & i., Liverpool, thus indicating the possibility of a market over there for Cubas if prices here should decline 1-16c. further.

One notable feature of the situation in the United States is that there has been some scarcity of medium and low grade soft refined sugars which is probably accounted for by the scarcity of low testing raw sugars. It would seem that frequently, as at this time, lower testing raw sugars would find a readier if not a relatively higher market than very high testing Centrifugals.

The European market, as mentioned above, is quoted with an improving tendency on basis of 10s. 2¼d. for this and next month, and 10s. 3¾d. for May, after having been slightly lower during the week. The more important feature for Europe, however, is that there are buyers and the market is showing more activitv. F. O. Licht continues to report un-

favorable weather for field work for the beet crop. Reliable estimates for increase or decrease of sowings are not yet at hand.

The tone and tendency at the close appears to us to be changing in favor of sellers.

Cuba Crop.—Hawana, Jan. 14, 1909—(From our Regular Correspondents)—We experienced frequent heavy showers nearly all over this island during the beginning of the present month, which, though very beneficial to the crop in general, delayed somewhat the beginning of grinding in some Centrals, obliging a few others to stop operations for a few days. Nowadays, with the Bagasse burners and the great facilities for the hauling of the cane, rainy weather—unless it should be very heavy and prolonged—has no importance or alarming consequences to the crop. We need during the grinding season, at least once a month, good soaking rains for the conservation of the cane.

Czarnikow, MacDougall & Co., in their statement of January 22, say:

There have been fairly large transactions this week in Cubas at 2.31c. c. f. for first half February shipment. This represents a decline of 062c. on the prices paid last week for January shipment. As the February production of the island is likely to be double that of January, the concession in price made by sellers is explained.

It is fully confirmed that the sales of Cubas up to this time are considerably ahead of those up to same date last year. This undoubtedly strengthens the position of the planters who have been selling and prepares them for making a better stand than they otherwise could for the rest of the season.

The interest shown by refiners is easily accounted for. They are unusually bare of stocks of raws and have to meet the demands of distributors who are extremely short of supplies of refined. At the close the market is very firm with buyers at 2.31c. c. f. for first half February shipment.

New Orleans buyers have already entered the market for foreign sugar and have made a small purchase of Cubas for first half February shipment.

The question of supplies for the current year is one that always arises at this time, but estimates are necessarily approximate. In this connection the following figures are of interest:

IMPORTATIONS OF FOREIGN SUGAR AT THE ATLANTIC PORTS AND NEW ORLEANS DURING 1908.

	Duty Free.		Modified Duty		Full Duty.		Total
	Porto Ricos.	Hawaii	Cuba.	Philippines.	Other Cane.	Foreign Beet.	Tons.
Atlantic Ports..	141,425	260,013	884,486	45,089	525,924	77,633	1,394,570
New Orleans...	43,660	.....	27,256	.....	12,418	62,017	145,351
Total.....	185,085	260,013	911,742	45,089	538,342	139,650	2,079,921
TENTATIVE ESTIMATE FOR 1909.							
Total.....	220,000	260,000	1,200,000	50,000	430,000		2,160,000

The main item in the receipts of non-preferential sugar during the year 1908 was 430,000 tons from Java. If Java supplies 350,000 tons this year there will be no need of European beets. About 80,000 tons non-preferential cane from other countries must be reckoned upon.

REVIEW OF SUGAR MARKET, 1908.

Messrs. Czarnikow, MacDougall & Co., at the beginning of the year, published their usual review of the sugar market for 1908 which is as follows:

The market opened with a strong undertone, and with sellers asking an advance in price. Cubas for January shipment, which had sold in December at 2.50c. c. f., were only obtainable at 2.56c. c. f., and business to a fair amount was done at this price. Guma-Mejer estimated that there were canes enough to yield a crop of 1,165,000 tons, but planters generally declared that such a high output could not be realized. The middle of the month brought a decline of .06c. in Cubas and a corresponding decline in other grades. Interruptions to grinding and delays to shipment caused a moderate scarcity of supplies in New York, and during this time a Java cargo of 5,620 tons held in store here for European account was sold at 4.10c., a price .20c. above current quotations. This closed out Importers' stocks. As the month progressed, Cuban planters found it necessary to reduce their prices in order to find buyers for their increasing production, and in the closing days of the month Cubas sold at 2.41c. c. f. for February shipment, and at 2.38c. c. f. for March shipment. The number of Centrals at work in Cuba had risen from 18 at the end of December to 145 on January 31.

February opened with a steady market, but about the middle of the month, under pressure of Porto Ricos prices declined .08c. to 3.67c. landed, which made Bond value of non-preferential sugars only 1.98c. c. f. This caused some sales of San Domingos to United Kingdom. At this time Cubas sold at 2.31c. c. f., the lowest, so far, this year. Cuban sellers, generally, did not press their sugars, and after the lapse of

a week, refiners paid 2.38c. c. f., later 2.50c. c. f., and in the last days of the month 2.53c. c. f., but the final price was 2.50c. c. f. The turn of the tide had been fairly started by an advance of .19c. from the lowest price. This upward movement was undoubtedly due to a growing conviction that Cuba could not produce the estimated crop. Cuba reached its maximum number of 168 centrals grinding. In the closing days of the month, refiners bought new crop Javas.

March had hardly begun when the market again reached 2.56c. c. f. for Cubas (3.92c. landed), followed within a few days by sales at 2.62c. c. f., and before the middle of the month by sales at 2.75c. c. f. Guma-Mejer announced that they now estimated the Cuban crop at 900,000 tons minimum, 1,000,000 tons maximum. This added to the strength of sugar markets everywhere. Prices advanced here by rapid strides, and by the end of the month sales of April Cubas had been made at 3c. c. f. and of May at 3.06c. c. f. Refiners in addition to making further large purchases of Javas for June—July shipment entered the European market and bought beets, paying 11-9 c. f. equal say, to Cubas at 3c. to 3.05c. c. f.

April—The month opened with buyers holding aloof and inclined to let the market rest after the heavy business of the previous month. A sale was made of Cubas at 2.94c. c. f., a concession of .06c., but news of the cessation of grinding on many estates caused renewed firmness and the market advanced first to 3c. c. f., later to 3.06c. c. f., and before the close of the month to 3.12c. c. f. for Cubas (4.49c. landed), and 4.42c. c. i. f. for Porto Ricos. These were the culminating prices of the year. In the final days of the month there was a lull, a decline of 3d. in European beets having caused a quieter feeling.

May opened with extreme dullness, and by the end of the first week prices had declined .12c. Receipts at the Atlantic ports in the second week reached the high total of 76,000 tons, and refiners having ample supplies showed great indifference to offerings. Some importers began storing, in the expectation of a recovery in prices later in the season. Mr. F. O. Licht estimated that the beet sowings would be 2½ per cent less than last year's; but this forecast had no effect upon United States markets. On the 19th, 40,000 bags Porto Ricos arrived and afloat were sold at 4.24c. c. i. f., and Cubas about due were sold at 2.87c. c. f., a decline of .12c. from the prices paid early in the month. Later in the month, reports from Cuba showing that centrals at work were reduced to 11 proved that crop was nearly over and Cubas recovered to 3.03c. c. f. Javas amounting to 11,000 tons cleared for United States being the first of the new crop. Two important events occurred this month, the first the action of the British Government in reducing sugar duties so that 98°, which had formerly paid

4s. 2d. per cwt. (9.10c. per pound), now paid only 1s. 10d. per cwt. (4-10c. per pound). The other and more far reaching in its effect upon this market, the introduction by the American Sugar Refining Company and Messrs. Howell of new selling terms for refined. These terms abolished the old privilege of thirty days for removal with prices guaranteed till date of delivery, and restricted the time of removal to seven days from date of purchase. Mr. F. O. Licht estimated the European beet crop of 1907-08 at 6,542,000 tons, as against preceding crop of 6,710,800 tons.

June opened slightly easier, with sales of Cubas at 3c. c. f., but market showed more animation. Two cargoes of old crop Javas lying in Liverpool were bought for export to the United States, and later a sail cargo of Javas at Breakwater was sold at 4.25c. Considerable quantities of San Domingos in port were also sold at this price, and Cubas afloat at 2.90c. c. i. f. Refiners bought beets in Europe. On the last day of the month, Cubas for July shipment sold at 2.94c., basis 95°. In spite of extremely favorable weather for the fruit crops, demand for refined hung fire, the trade having been disorganized by the new terms.

July brought a slightly improved demand for refined and increased meltings, but the former was of short duration and gave way to unwonted dullness for the season of the year greatly to the disappointment of the trade and of refiners. At the beginning of the month prices of raws had improved, and Porto Ricos had sold at 4.39c. landed, but refiners' lack of success in disposing of their own product made them fight shy of raws, and these started on a downward course. Sales of Cubas at Breakwater were made at 2.81c. c. f., basis 96°, but sugars for shipment brought 2.89c. c. f.

August—The market, after a brief display of steadiness, declined .06c., quickly followed by another decline of same amount. The latter was the result of a sudden drop of 6d. per cwt. in European beets on the apparent relinquishment of all hope of a further demand from America. Business in refined showed no improvement, the trade confining itself to hand-to-mouth purchases because of the new terms and the unstable condition of the raw market. The largest consumers of raws had ample supplies of Javas on the way and were out of the market. The other refiners had enough for their wants in a dull refined market, and they knew that 50,000 tons unsold Javas were afloat. By the end of the month disappointed holders of Cubas in store accepted 3.90c., basis 96°, and prices were .35c. lower than when the month opened.

September—Javas afloat were the centre of interest. Owners of cargoes nearly due became anxious sellers, and the first transaction of the month was the sale of a cargo at 10s. c. i. f. followed by another at 10s. 1½d. c. i. f., and a few days later

by a third at 10s. 5¼d. c. i. f. These low prices were in marked contrast to 12s. c. i. f. paid by refiners in June for Javas for August arrival. Cubas afloat sold at 2.50c. c. f., basis 95°. The business in refined showed an improvement, which caused refiners to advance their prices and to take more interest in raws. On the 22nd 100,000 bags Cubas in store were taken at 3.98c., an advance of .08c. on the price paid in August for stored Cubas. This sale wiped out Importers' stocks. During the month four Java cargoes intended for this market were diverted to the United Kingdom.

October—Extreme dullness marked the opening of the month. There was only one buyer in the market, and that buyer's stand caused three Java cargoes to be stored and two to be ordered to the United Kingdom. The last central at work in Cuba ceased grinding. The market improved on reports of drought followed by severe frost in Europe and on an advance in prices there. A Java cargo afloat brought 10s. 9d. c. i. f., and Cubas sold at 2.62c. c. f., basis 958. Towards the end of the month the market suddenly changed. Factory estimates of the beet crop showed that little or no damage had been done, and a drop of 6d. per cwt. in Europe at once cast a damper on the raw market here. At the close a Java cargo at Breakwater, which had been held for 11s. c. i. f., was sold at 10s. 4½d. c. i. f. The month closed with the market in a state of stagnation, public interest being centered in the approaching election.

November—All markets were idle until after the Presidential election on the 4th. The choice of Mr. Taft had a good effect on business generally, but in the case of sugar this result was more than neutralized by an aggressive fight among refiners and much cutting of prices. This reacted on raws, and a Java cargo in port was sold for 10-3 c. i. f. In New Orleans refining grades of Louisiana were sold at 3.62c., basis 96°. Some new crop Cubas for December-January shipment were sold at 2.50c. c. f. The Ways and Means Committee of the House of Representatives held Tariff Hearings in Washington, and on the 17th and 18th heard testimony on sugar. Towards the close of the month new crop Cubas for January shipment were sold at 2.56c., basis 96°. Fairly large purchases of Cubas for March shipment were made by European operators at 2.50c. c. f., basis 96°. During the month the refined product declined .30c. as a result of the conflict among refiners. The decline in raws did not exceed .06c., but business was paralyzed by the refined situation.

December—The month opened with sales of old crop Cubas at 2.56c. c. f. and of Surinams at 3.92c. landed, but within a few days new crop Cubas for December shipment and Surinams for December arrival sold at 2.50c. and 3.86c. respectively, and there has since been a large business at gradually

declining prices which have brought quotations for new crop Cubas, January shipment, down to 2.31c. c. f. and of Porto Ricos to 3.67c. c. i. f., and we are now .18c. below the closing prices of last year, although the European beet market is 3d. higher now than then.

The year has unquestionably been a disappointing one to both producers and refiners of sugar. In the early part of it, Cuba was regarded as being the key to the situation, and when proof was forthcoming that this year's crop would be in round figures nearly 500,000 tons less than its predecessor, the world's markets responded, for it meant larger demands from United States for supplies from Java or Europe. In the former, particularly, was the effect of the Cuban shortage apparent. As early as February refiners here and operators in Europe were buying Javas for May-June and later shipment, and prices advanced from 10s. 6d. c. f. to 11s. 6d. c. f., and afterwards to 11s. 10½d. c. f. The buying by European operators, no doubt, contributed to this advance; but later in the season their holdings became a source of weakness, for such cargoes as had not been sold before shipment were in the majority of cases parted with at a loss.

When the Cuban crop was finished it was found that the total production was 961,958 tons, or 465,715 tons less than the previous one. This deficiency in the output of the principal source of supply was partly offset by an increase of 105,000 tons in the Louisiana crop. The sugars which chiefly went to make up the balance of the deficiency were Javas, of which 417,000 tons were received at the Atlantic ports, against 255,000 tons in 1907; and Europe, which gave to the Atlantic ports 78,000 tons, against 7,000 tons last year, and to New Orleans 62,000 tons against nil last year. New Orleans got about the same quantity of Javas as last year, namely, two cargoes. The Philippines gave the Atlantic ports 36,000 tons, the Hawaiian Islands 22,000 tons, and non-preferential West Indies 47,000 tons more than last year. The result of these and some smaller additional contributions was to more than offset the Cuban shortage.

The highest prices were reached in April, when Cuba Centrifugals sold at the equivalent of 4.49c. landed; the lowest in February and again in December, when Centrifugals sold at 3.67c. The corresponding prices for Cubas are 3.12c. c. f. and 2.31c. c. f.; for San Domingos and other non-preferentials, 2.79c. c. f. and 1.97c. c. f.

The downward course of the market from April onwards was a surprise, for the prices of that month seemed fully justified by the Cuban shortage as well as by the entire absence of the monetary troubles of 1907. The natural conditions in the shape of a fine season, and large fruit crops were all most favorable to a large consumptive demand for refined and in

the same degree for raws, yet the demand did not come and prices fell away. The effects of last year's panic may have continued to tell on this year's buying power, but this cause for a falling off hardly accounts for long periods of poor demand for the refined product. Probably the change in refiners' terms was the chief cause. It turned a business which had always been marked by large buying orders at certain seasons of the year and by a wide advance distribution, into one of a purely hand-to-mouth character, and by restricting the call for defined lessened the call for raws. This of itself might well amount to a falling off of 50,000 tons in refiners' melting requirements during the summer, and so small was the surplus supply of raws at one period of the year that a call for 50,000 tons more would have meant sustained prices instead of falling ones. There rarely has been a year in which the reliance of holders of raws upon a good summer demand was more justified and less realized.

The following table gives the prices at the beginning of each month of spot Centrifugals duty paid of Centrifugals c. f. from Cuba, and c. f. from non-privileged countries; also, of beets f. o. b. Hamburg:

1908	Spot Duty paid, Cents	Cubas c. & f. Cents	Non-pv'd c. & f. Cents	Beets f. o. b. s.	d.
January 2	3.92	2.56	2.22	9	11¼
February 1	3.74	2.38	2.04	9	10½
March 2	3.86	2.50	2.16	10	0¾
April 1	4.36	3.00	2.66	11	3¾
May 1	4.42	3.12	2.76	11	9
June 1	4.36	3.00	2.66	11	3¾
July 1	4.33	2.98	2.64	11	2¼
August 1	4.25	2.89	2.55	10	6¾
September 1	3.90	2.55	2.21	9	6
October 1	3.98	2.59	2.24	9	6
November 2	3.96	2.62	2.28	9	11¼
December 1	3.92	2.56	2.22	10	2¼
December 31	3.67	2.31	1.97	10	3

Willet & Gray's annual statement of the sugar business of the United States digested is as follows:

The figures show the consumption of sugar 3,185,789 tons, an increase of 191,810 tons from 1907 or 6.406 per cent increase, against an increase of 129,966 tons or 4.538 per cent increase for the preceding year, against 4.551 per cent average yearly increase for 27 years.

The total consumption of sugar upon which full duty was paid was 684,625 tons, and of sugar on which a concession

of duty was allowed was 1,600,166 tons. Consumption of Domestic production 900,998 tons.

Cuba contributed 916,742 tons; Hawaiian Islands, 453,250 tons; Porto Rico, 185,085 tons; Philippine Islands, 45,089 tons; domestic cane, 390,888 tons; domestic beet, 493,200 tons; maple sugar, 11,000 tons; and molasses sugar, 5,910 tons.

The total consumption of refined sugar in 1908 was 3,022,153 tons, of which the American Sugar Refining Company manufactured 1,364,286 tons, or 45.14 per cent, against 49.27 per cent in 1907, and 51.03 in 1906.

The independent refiners manufactured 1,147,712 tons, or 37.98 per cent, against 37.44 per cent in 1907, and 37.38 per cent in 1906.

Domestic beet sugar factories contributed 492,969 tons, or 16.31 per cent, against 13.19 in 1907, and 10.87 in 1906.

The Hawaiian cane factories contributed 15,442 tons, or .51 per cent, against .06 per cent in 1907, and .61 per cent in 1906.

Foreign refined supplied 1744 tons, or .06 per cent, against .04 per cent in 1907, and .11 per cent in 1906.

The average difference between raw and refined in 1908 was .884c. per pound, against .893c. per pound in 1907, and .829c. per pound in 1906.

For the year 1909, the average for raws, under the outlook of supply and demand, should be rather less than in 1908.

SUGAR IN CUBA.

The probabilities in favor of a large crop of sugar in Cuba during the present grinding season are set forth as follows by Consul-General James L. Rodgers, of Habana:

At this time the estimates of the production of 1909 are becoming more and more optimistic and seemingly with good warrant, since the weather has been all that could be desired by the cane growers, and in addition there has been every evidence of the intention to expand the crop as much as is possible.

To understand properly the relation the prospective sugar crop of Cuba has to those of the two years preceding it is necessary to repeat some facts and figures. In the growing season of 1906 while there was good weather, with the exception of one hurricane which swept a sugar-cane area, there was a state of uncertainty regarding labor. Yet, despite untoward conditions which disturbed credits, the outcome in 1907, as announced officially, was 1,441,687 tons, a gain of 211,951 tons over the preceding crop, thus making it the largest Cuban sugar crop in history, that of 1906 having had the previous record. To make this output, the mills began grinding in mid-

December and continued until mid-May, and every plant on the island which could turn a wheel was at work. The result was surprising, because it was supposed that scant cultivation, due to the disturbed conditions, would greatly affect the output.

But the great gain in 1907 was no more surprising than the great loss in 1908, when the production, after an unduly prolonged grinding season, fell to 961,958 tons (semiofficial figures). It is true that there had been a drought; that the planters and mill owners were in doubt as to the future, and that the financing of operations was difficult and expensive, but still it was hard to realize that in a time of peace there could be such a difference in the output. However, the quality of the cane explained the matter, and this was proven principally by the fact that while 186 mills ground in the preceding year only 170 operated in 1908.

After such a result it might have been expected that the natural discouragement would have been reflected in the prospect of 1909. But hardly had the mills in the far eastern section stopped their prolonged grinding, and thus swelled the scant total of the 1908 crop before the weather became propitious, and in a short time it was seen that should these conditions continue a great cane crop was in prospect. Old plantings were rejuvenated; young plantings, which had been despaired of, exhibited lusty growth. This condition improved with each month until the sugar man found himself under the necessity of counteracting the prevalent idea of a big output and a lower price. Such is the status today. The general verdict is that Cuban cane in all sections of the island never looked better, that it never gave a better promise of sugar production, and that a busier season was never indicated, while the sugar producer preserves an attitude of doubt and calls attention to the possibility of damage in January or February, 1909.

With such a review of the past and present it is now permissible to turn to the future and compare the 1909 possibilities with those of the official statements of 1907. It has been stated that in the grinding season of 1907 (the year of sugar production is used in all cases without reference to the year of cane growing) 186 "centrales" and "ingenios" operated on full time to produce the total of 1,441,687 tons. But it must be remembered that these were all of that period—the good, indifferent, and bad; the mill of modern type and high efficiency; that of an approximation of such desirability, and that of obsolete character and high cost in production. These 186 mills used all the grist offered. But in two years there has been a great change in the quantity, not only of raw material, but also in the capacity to grind it. One magnificent estate of the Cuban-American Sugar Company produced in 1907, according to the official statement, 4,387,032 arrobas (25 pounds to

the arroba), or 48,960 tons, and yet it is stated that the mill was not worked to full capacity on account of lack of cane. This year it is announced that the supply of cane has greatly increased, owing to the availability of the young plantings, and that there will be a much larger output from that fact alone. Another case is that of the central "Boston," owned by the United Fruit Company. In 1907 this mill produced 3,644,132 arrobas, or 40,671 tons, and will increase its output in 1909 probably 20 per cent. The central "Preston" of the same company was practically only starting in 1907, when its output was 14,116 tons. This season it is thought that it will produce over three times as much. One of the prominent new mills will produce in this, its initial season, over 20,000 tons.

Generally speaking, every modern mill will greatly increase its product in 1909 by reason of greater capacity and greater cane supply through maturing young plantations as well as the fine condition of the old cane. The significance of this is made plainer when it is stated that in the output of 1907 the 36 American mills of that period, representing only about 19 per cent of the whole, accounted for over 30 per cent of the total production. This season these same American mills, improved somewhat and strengthened by their plantations, will, when joined with the several new mills, produce very nearly if not quite 40 per cent of the total. The gain thus made will certainly be one of the most interesting features of the season and will afford the opportunity for the discussion of the most important conclusion connected with the Cuban sugar business.

Apparently, as well as theoretically, therefore, the Cuban sugar output of 1909 is destined to be a large one. Conceding that something may happen to warrant the present conservatism of some mill owners whose salvation lies in a good price in the early days of the crop, and admitting all elements of doubt, the sugar output of Cuba in 1909 should be approximately as large as that of 1907. Eliminating the possibility of damage and accepting the future on the basis of the present, the output theoretically should be considerably larger than that of 1907, and 1,500,000 tons would not seem too great an estimate when the fine quality and quantity of the cane is considered. But, of course, in advance of the actual grinding with its resultant yields, it is all more or less guesswork.

SUGAR OUTPUT OF THE PHILIPPINES.

Following is an extract from the annual report of the Insular Collector of Customs at Manila for the fiscal year of 1908. It represents the present status of the Philippines on the sugar question:

On the other hand, sugar, which is the second product of importance, both in value and tonnage, aided in sustaining the volume of trade by an increased exportation as well as proportionate value, over the quantity and value of that article marketed during the preceding year.

The average quantity of sugar exported annually since 1898 has been 89,994 tons, from which the average yearly receipts were 3,464,027, constituing 13 per cent of the total export values.

The production of sugar in the Philippine Islands began in 1856, and for several years after it became a substantial factor in the commerce of the islands the profits of the industry were proportionately large. During this period no efforts were spared to increase the output to the utmost extent, but owing to local conditions, the annual production was never forced much beyond the normal crop of from 150,000 to 175,000 tons.

The most successful years, in point of production were 1902 and 1903, when the total annual exports were approximately 250,000 tons. But in recent years, since Philippine sugar has been practically excluded, by tariff barriers and bounties, from the most profitable markets, the lot of producers has been a precarious one indeed, and their profits, when such were realized, distressingly small. Although this experience has been a trying one, the result, in combination with other conditions anticipated, should prove a permanent benefit to the industry in the future, as the small returns realized from shipments to other countries have led to the introduction of sugar, as a staple commodity, into the interior of China with its millions of consumers, where its use was practically unknown twenty-five years ago.

But Chinese buyers will not pay more for Philippine sugar than it is worth for shipment to other markets, understanding perfectly well that by offering the equivalent of European or American market values (whichever happens to be the higher), less freight, and other expenses attendant upon the long shipments to those markets, they will usually be given the preference, because their market is within easy reach, settlements are more easily and quickly made, and they ask no questions about polarization, sugar being bought and sold in China entirely upon its color.

That China is the natural market for Philippine sugar, and that it will continue to be absorbed in that country, at prices fixed by competition, in exchange for the many articles which China furnishes for Philippine consumption, is clearly indicated by the sugar movements of the present year. When the shortage of crops in other parts of the world became known, the price of sugar rapidly rose in Western markets, a few cargoes were sent to the United States on speculation,

but as soon as the Chinese buyers found that the rise in value was a fact, they immediately responded by offering its equivalent, and since then practically all shipments have gone to China, which received 52 per cent of the entire exportations of the year.

In order to turn this important trade with China into a permanently profitable factor of Philippine commerce, we must have the regular competition of better offers, than was usually possible, for shipment elsewhere; and it has been in the confident belief that this relief would be extended by Congress, through the removal of the tariff upon Philippine sugar entering the mainland territory, that producers have continued operations and even endeavored to increase their output.

In view of the fact that the United States pays annually $100,000,000 or more, for sugar produced in foreign lands (not including purchases from Porto Rico and Hawaii amounting to over $45,000,000), while the entire Philippine crop, in the year of greatest production and at the highest price, was worth less than $10,000,000, and if exported exclusively to the United States (an improbability under any circumstances), would have replaced less than 10 per cent of the foreign sugar used, it seems reasonable to believe that the removal of the import duties upon sugar produced in the Philippine Islands will not be long denied when the conditions become generally known. The total average value of sugar exported annually from the Philippine Islands during the ten years since American occupation, as shown above was less than 3½ per cent of the value of foreign sugar consumed annually in the United States. Most of the shipments of sugar to the United States since 1898, which have been comparatively small, have been on speculation, usually resulting disasterously to the shippers.

During the last year the sugar exportations aggregated 149,323 tons, valued at $5,664,666, an increase of 30,928 tons and $1,730,206 in value over those of 1907, being the highest record in sugar transactions since 1898.

"The Secretary of Agriculture, Industry and Commerce of Cuba has issued a circular to the sugar-mill owners, and planters and the colonos, requesting that they communicate to him the location of their places, the scale of wages paid by them, and the number of workmen required, and the department will, without charge, furnish the necessary workmen."—*The Cuba Review.*

Fortunate sugar growers!

COST OF SUGAR PRODUCTION.

During the recent tariff hearing before the Committee on Ways and Means of the House of Representatives, the Dyer Company, builders of sugar works, submitted a statement comparing cost of production of marketable granulated sugar in United States from Cuban sugar cane, and domestic beet root.

The Dyer Company does not give the source of its information upon which its figures are based, and while the tables of cost may be absolutely correct, the selection of certain factories and the cost of production thereat, is not a safe manner of reaching an average of the cost of production of the entire or greater portion of a crop.

The statement, however, is interesting and we quote it as follows:

The consumption of sugar in the United States in 1907, according to Willett & Gray's Statistical Journal, was 2,933,984 tons. Under the present tariff rate, 40 per cent of this sugar is free of duty; 45 per cent comes in under a concession of 20 per cent from duty; but 5 per cent pays full duty. This is shown by the following table:

Table I.—Showing consumption of sugar in 1907, per Willett & Gray, in tons of 2,000 pounds.

Domestic:			
Beet	375,410		
Cane	264,968		
Maple	10,000		
Molasses	6,249		
		656,627	
Hawaiian		418,102	
Porto Rican		212,858	
Total duty free, 40 per cent			1,287,587
Cuban sugar, 20 per cent concession		1,340,400	
Philippines 25 per cent concession		10,700	
Total tariff-concession sugar, 45 per cent			1,351,100
Sugar on which full duty is paid, 5 per cent			355,297
Total consumption for 1907			2,933,984

The cost of production of either cane or beet sugar is an amount variable with the location and conditions under which it is produced. In making a comparison it is necessary to

place them at a parity as near as possible. To do this, I take results obtained from the best factories of both countries under conditions that are favorable to both industries.

It is quite true that the cost of production of cane sugar in Cuba in the old sections with their antiquated methods is higher than will be shown in my statements.

The same is also true regarding the production of beet sugar under modern methods in the less favored localities in the United States.

Preceding the detailed statement of cost of manufacturing of cane and beet sugar, I submit the following which will show that the figures given in Table III. are within the limits of practice:

Table II.—Showing the average of Cuban and Hawaiian estates.

	Average 16 Cuban	Average 7 Hawaiian	Per estimate
Per cent sugar in cane	13.94	14.79	14.00
Purity	84.16	88.88	84.00
Per cent sugar made	10.86	12.88	12.39
Pounds per ton of cane	217.20	257.60	247.80
Gallons molasses	5.22	.....	2.80

	Highest yields— 16 Cuban works	7 Hawaiian works
Highest per cent sugar in cane	16.28	15.73
Highest purity of cane	91.25	90.35
Highest per cent sugar made	12.45	14.01
Highest pounds sugar per ton cane	249.00	280.20

The difference in results in the foregoing table in favor of the Hawaiian sugar houses is owing to better methods of the latter, which is equaled by the best Cuban factories.

Table III.—Showing statement of cost of production for sugar from Cuban sugar cane and domestic sugar beets.

	Sugar cane *Per ton*		Sugar beets *Per ton*	
Cost of growing	$1.6964		$3.000	
Freight	.2567		.350	
Agricultural experiments	.0479		.172	
Net cost delivered		$2.001		$4.522

Operating expenses:				
Labor.	.2330		.5541	
Fuel.	.0444		.42	
Lime.	.0025		.21	
Chemicals.	.0061		.0313	
Lubricants and waste.	.0067		.0100	
Filter cloth	.0111		.050	
Laboratory supplies	.0028		.0083	
Packages, bags	.1167		.3400	
Cutter knives and files.	. . . . .		.0074	
Miscellaneous.	.0056		.0150	
		$0.4289		$1.6461
General expense:				
Administration	.0555		.160	
Maintenance.	.2778		.50	
Interest.	.3333		.6250	
Taxes.	.0167		.1333	
Insurance.	.0013		.0250	
		.6846		1.4433
Total cost		3.1145		7.6114

The above statement shows the cost of production and the manufacturing cost of raw sugar in Cuba and granulated beet sugar in the United States. It may be noted that it costs double the amount to produce a ton of beets than ton of sugar cane. This is particularly due to the fact that the yield of sugar cane is greater per acre, averaging 30 tons, for a period of ten years, and requires planting only once during that time, while the sugar beet yields in the best localities 12 tons per acre and requires planting every year.

The operation of a beet plant is much more complex than that of manufacturing raw cane sugar. In the item of fuel, the well-constructed cane plant is supplied at comparatively no cost by using the cane after the sugar has been extracted, which furnishes all the fuel required.

The manufacture of beet sugar requires 12 to 14 per cent on the weight of the beets in coal for fuel.

In the item of labor, supplies, taxes, and like items the cost is much greater, more than double, in beet sugar plants, as may be seen by referring to the above table.

The cost of production of sugar from either plant varies according to the sugar contained in the plant and its degree of purity. I submit a table showing the yield of both in raw and refined cane sugar and granulated beet sugar from their respective plants of the same analysis:

Table IV.—Cost of production in terms of raw and refined sugar from materials of varying quality.

Analysis.		Per ton sugar cane.				Per ton sugar beet.	
		96 per cent raw sugar.		Refined f.o.b New York.		Granulated white sugar.	
Perc ent sugar.	Purity.	Pounds.	Cost per pound.	Cost per pound.	With duty	Pounds.	Cost per pound.
			Cents.	*Cents.*	*Cents.*		*Cents.*
14	84	247	1.261	2.034	3.382	208.5	3.65
15	84	266	1.171	1.94	3.288	224.8	3.386
16	84	286	1.089	1.854	3.202	241.1	3.157
17	84	305	1.021	1.784	3.132	257.4	2.957

No account of molasses is taken in either case.

The cost of refined sugar is found by reducing the raw sugar to terms of pure sugar and adding cost of—

	Cents
Freight from Cuba, per 100 pounds	10.0
Marine insurance, basis of 2½ cents c. and f.	1.0
Mending, weighing, and tare	1.5
Lighterage, if any	3.0
Brokerage	.5
Commission, at 2½ cents	6.0
Per pound	.22
Duty 1.685 cents, less 0.337 (20 per cent differential)	1.348
Cost of refining on pure sugar	.50
Total	2.068
The average net price, 96 per cent raws f.o.b. Cuba,	2.247
past ten years	2.15

By referring to Table IV. it may be seen that the average sugar cane 14 per cent, 84 purity, will yield 247 pounds sugar per ton, which is shown to be substantially the same as shown as Cuban and Hawaiian results in Table II. That the same sugar may be laid down, refined, and duty paid, f.o.b. New York for 3.382 cents per pound.

It is also shown by the same table that the average sugar from sugar beets of 15 per cent, 84 purity, which is the average of beets grown in the United States, will yield 224.8 pounds of granulated sugar, at a cost of 3.386 cents, as substantiated by Table V. The evidence is that the cost of Cuban sugar under present duty laid down and refined in New York without profit to the producer is nearly the same as the cost of producing dry granulated beet sugar without profit to its producer.

Table IV. shows that in the production of sugar from either cane or beet, under existing duty, from plants containing less

than 15 per cent sugar, the advantage is in favor of production of sugar from sugar cane, but from plants containing above 16 per cent sugar the cost of production favors the sugar beet. This advantage, however, is lost to the manufacturer of beet sugar for the reason that it must include the profits to the farmer. The producer of sugar cane has another advantage in the fact that it requires much less labor to produce sugar cane than it does to grow sugar beets, and it is easily within the resources of a cane factory to grow and harvest its own sugar cane. But with a beet factory the requirements in the way of intensive cultivation, labor, implements, and cost is so great as to make it too unwieldly and impractical for the beet-sugar factory to grow its own crop.

The following table shows the cost of production of sugar from ten modern and well-located factories in the United States, and is offered in corroboration of Table IV.:

Table V.—Cost of making beet sugar in seven representative factories.

—Analysis—		—Cost—	
sugar Per cent	Purity	beets Per ton	granulated Per pound
14.68	82.8	8.30	3.461
14.80	83.6	8.223	3.583
15.05	84.5	8.155	3.630
15.10	82.1	9.095	3.650
15.49	82.3	8.493	3.532
15.54	83.9	9.032	3.574
14.73	81.4	8.356	4.695
15.055	82.9	8.522	3.732

From a study of Tables II., III., IV. and V., it may be seen that the quality of either cane or beet makes an enormous difference in the cost of production of sugar. The beet grower by modern methods and intensive cultivation has reached nearly the maximum of what may be expected from that plant, while the cane-grower, on the other hand, has not improved his methods for generations, it being quite easy for him to increase both the yield in tons and sugar percentage by improving his methods in both field and factory.

The deveplopment of the Cuban sugar industry is a question of finance and improvement of methods and not one of reduction of duty.

I lay particular stress on the cost of production and refining of Cuban cane sugar as compared with that of production of domestic beet sugar, for the reason that Cuba is our principal source of supply and the greatest competitor of the

American market. It is the country that the producer of sugar in the United States has most to fear.

The cane sugar industry may be readily extended in a comparatively short time to produce more than the entire consumption of the United States. Only 20 per cent of the tillable land of the island is now under cultivation. The cane industry will continue to expand rapidly under the present tariff. Cuba is in a position to compete in the markets of the world, while the domestic grower of cane and beet sugar requires protection in the home market.

The price of sugar is made in Magdeburg, Germany. The market price of 96 degree sugar on November 25, 1908, was in Magdeburg 2.7 cents per pound. In New York, not including duty, 2.592 cents per pound, which shows that Europe is as favorable a market today for Cuban sugar as is New York, except for the 20 per cent concession from the Dingley tariff. It is a question as to the benefit of the 20 per cent concession to the Cuban grower. The price of Cuban sugar in New York should be 2.929 cents a pound for 96 degree sugar instead of the prevailing price of 2.952 cents a pound, if the benefit of such concession inures to the Cuban planter.

WORK OF UNITED STATES FOREST SERVICE FOR THE YEAR 1908.

For the administration and protection of the 182 National Forests in seventeen states and territories and Alaska, the Government spent $2,526,098.02, or about one and one-half cents an acre. Permanent improvements, including the construction of 3400 miles of trails, 100 miles of wagon roads, 3200 miles of telephone lines, 550 cabins and barns, 600 miles of pasture and drift fences, 250 bridges, and 40 miles of fire lines cost $592,169.19. Telephone wire to build approximately 400 miles of additional lines was shipped to the Forests, but with the funds available before the close of the year the work of construction could not be completed. Some of this work was done on each of the Forests in the United States.

Although many needed improvements could not be undertaken, the benefits of what has been accomplished are seen in the more convenient and economical manner in which the Forest officers are enabled to carry on their work and in the opening up to Forest users of territory hitherto inaccessible. The remaining $297,840.40 of the total of $3,416,107.61, disbursed on account of work of the Forest Service was used in forest investigations costing $235,855.14, and in diffusion of forest information and federal coöperation.

The Forest Service is one of the branches of the government where everything is not outgo. Last year the receipts from sales of timber, grazing fees, and permits for special uses of forest resources amounted to $1,842,281.87, an increase of $271,222.43 over the 1907 figures. The per acre receipts from the National Forests were a little more than one cent, less than five mills under the per acre cost of administration and protection of the forests.

The amounts paid the states and territories, to be expended for roads and public schools from the year's receipts, amounted to $447,063.79. Chiefly because of increasing the revenue to the states from 10 per cent in 1907 to 25 per cent last year, there was a total increase of $294,031.62 in the amounts payable to the states.

In addition, the National Forests yielded heavily to the public in free use. There were 30,714 permits granted for the free use of timber by settlers, schools and churches, during the year, against 17,399 in 1907. The number of board feet used in this way by the public amounted to 131,582,000, valued at $168,720.00, compared to 63,000,000 feet, valued at $75,000 in 1907.

The aggregate of free use of the Forests for grazing can not be exactly known, since no permit is required to be taken out, and there is therefore no record preserved. It added perhaps 10 per cent to the amount of stock carried by the Forests. Settlers living on or adjacent to the Forests, and prospectors, campers, and travelers in them are allowed to graze free up to 10 head of milk cows, work animals, or horses in use, and purchasers of timber and stockmen on the Forests are given the same privilege for the horses needed in their work. In Arizona and New Mexico milk goats to the number of 30 may be grazed free in place of milk cows.

Of free special-use permits there were issued during the year 1768, as against a total of 1471 previously granted. Of the latter 963 were in force during the year.

The grazing receipts for 1908 were $962,829.40, and were paid by the holders of 19,845 permits to graze 1,382,221 cattle, horses, and hogs, and of 4282 permits to graze 7,087,111 sheep and goats. Receipts of $849,027.24 from timber sales were paid by approximately 5189 purchasers, who cut the equivalent of 392,792,000 board feet of timber. The receipts from special uses amounted to $30,425.23 and were paid by 2065 permittees.

The year's receipts represent profitable use of the Forests by some 30,000 individuals or concerns, in addition to more than 30,000 getting free use of timber and other resources. About one-fourth of all the timber cut from the National Forests contribute most effectively to the public welfare. The timber given to individuals is given for the development of the country through settlement.

The total receipts from timber sales each year since the National Forests have been under the administration of the Forest Service have been as follows: 1905, $606,136.62; 1906, $245,013.49; 1907, $668,813.12; 1908, $849,027.24.

At the end of the last fiscal year, when business was heavier than at any other time during the year, the 182 National Forests were cared for by an executive and protective force of 29 inspectors, 98 forest supervisors, 61 deputy supervisors, 33 forest assistants, 8 planting assistants, 491 rangers, 521 forest guards and 88 clerks.

The average area to each officer theoretically available for patrol duty was 116,665 acres. But more than three-fourths of the time of these Forest officers is now required by the fast-growing volume of National Forest business, so that in point of fact the force on duty at the close of the year provided about one patrol officer to each 500,000 acres of Forest. This is considered inadequate for protection of the Forests. Until provision is made for a large increase of force it is necessary either to curtail the business arising from use of the Forests or to neglect the proper safeguarding of Government property against fire.

Experimental broadcast sowings were made during the year in 27 Forests, in the States of Idaho, Montana, Washington, Oregon, Wyoming, Colorado, Utah and New Mexico. The total area sown was 131 acres, of which 47 were in the Black Hills National Forest.

About 700,000 trees were planted last year on Forests in the States of Nebraska, Kansas, Colorado, New Mexico, Arizona, Utah, Idaho and California. There are now growing at the planting stations over 2,200,000 trees which will be ready for planting in 1909. Sufficient seed was sown in the spring of 1908 to produce 4,600,000 seedlings.

Besides administering the National Forests, the Forest Service renders, on request, expert advice and assistance to other parts of the Executive Government regarding the practice of forestry. Work of this kind was carried on several military and Indian reservations in various parts of the country. Co-operative State forest studies were carried on with Kentucky, Mississippi, New Hampshire and Illinois.

The Forest Service conducts investigations of forest products along the two lines of wood preservation and wood utilization. Some of these investigations aim primarily to promote better use of National Forest timbers; others seek results either of general application or contributing to the best use of the forests of some special region.

CONSERVATION IN HAWAII.

[Address by F. H. Newell Before Territorial Conservation Commission.]

The problem of conservation is not merely Territorial but is of national importance. The Hawaiian Islands being a territory of the United States, the citizens of the whole country should be brought to a better appreciation of their possibilities for development, and should give a substantial backing to your efforts.

SOIL CONSERVATION.

After a six-week trip around the islands the thing that most impresses me is the need of conservation of the soil. I am very greatly impressed with the rate at which the land in some places is being washed or blown away. Forest and water supplies can be renewed by various methods, but the soil supply cannot. Kahoolawe illustrates this in the extreme degree. There the soil has been literally carried away to sea—soil that might have been kept as a valuable asset. At present there is practically nothing over a large part of the island but bare rock and no possibility of getting anything there. This, of course, is an extreme case, but it shows what is liable to happen elsewhere.

The first thing to do in conservation work is to arouse public sentiment along the line that it is the duty of the state to protect its soil. Possibly it may be found wise and practicable to enact regulations to the effect that a man will not be permitted to handle his land in such a way that he will destroy his soil. Here in Hawaii you have examples of the most extreme condition where neglect has caused soil to actually disappear and to be lost forever.

WATER CONSERVATION.

Water conservation has been begun in Kohala and Hamakua and other places and excellent work done, showing what can be accomplished on a larger scale. Apparently much more can be done. There appears to be a considerable area of public land in Hawaii that can be reclaimed in a manner similar to what has been on the mainland. There, after reclaiming the land, the Government divides it into portions or farm units of 10, 20 or 40 acres or more, and then distributes it to the men who will actually live on it and improve it for the support of themselves and their families. This law author-

izing Federal reclamation work does not apply to the Territory of Hawaii, but I have hopes that it can be made to apply. Congress is beginning to reecogniz there is such a place as Hawaii! Even if action by Congress is delayed, in the meantime you can take advantage of the experience you have had and do much locally.

LAND SETTLEMENT.

It is necessary of course to provide homes for the native population; give them the preference, as has been done on the mainland with the North American Indians—preference to the extent of land enough for the support of a native family, two or three acres of good land,—and then distribute the rest to desirable American citizens.

It should be possible to secure for Hawaii men such as have built up Southern California; men of moderate means, men who have earned say ten thousand dollars in small business enterprises in the East, and who have come out to California to raise something, not to sit idly. These men have built up the southern end of that State to a remarkable extent. This class of men is still coming West and some will unquestionably come to these islands. I look forward to that small but steady stream of immigration turning this way and in view of it I hope the Territory will preserve the public lands, irrigate them as far as it can, and at the same time ascertain from owners what private lands may be made available for settlement in the same way. Hawaii has much to attract such a ciass of settlers—once here they would be a potent faction in the development of the Territory.

TRANSPORTATION QUESTION.

The question of transportation is closely joined to that of settlement. Home building and road building, wagon roads, railroads, steamship lines, all must improve together. This class of desirable citizens must have transportation facilities adequate to develop small industries such as are dependent on favorable transportation rates. At present it is said that vegetable and dairy products can be shipped to Honolulu from California in good shape at rates that are less than those for which island products can be shipped to Honolulu from the other islands. If true, will it not be possible to better this condition?

The financial prosperity of the islands at present largely rests on a peculiar basis, that is on the duty on sugar. This is not a very firm foundation and the islands should have something in the shape of other products so that if the tariff is disturbed, things would not all go to smash at one time!

There is no part of the country that impresses me more with the necessity of conservation than Hawaii, nor any part where conservation should result in more immediate benefit. It is a great problem and the quicker we begin work the better.

SPECIALIZATION NEEDED.

I have watched how some men have built up certain specialized industries, for example, a superior variety of apples. By cultivating, studying the packing and shipping of this apple they have brought millions of dollars into a State. Or for another example take Grand Junction, Colorado, where superior peaches have been developed. The pioneer growers had the usual struggle to get a market, but they have developed a business that brings something like $4,000,000 per annum into that mountain valley. Here in Hawaii with steamship lines running to important points of trade, it seems that you are very closely connected with good markets. Steamship transportation is better than the average freight haul in the interior!

If you can get a pineapple or a banana or some other fruit that is superior to those on the mainland, you should have no trouble getting a market. It is my hope that we may find reclaimable areas above the sugar lands that are suited for growing such crops.

STUDY MARKET REQUIREMENTS.

Of course, the first men on the ground are the ones who suffer most from obstacles and who have the most discouragements. They must experiment and work hard, and until they find the particular thing adapted to the climate they certainly have a discouraging time. In Southern California, all the growers belong to associations. This insures a certain uniformity of packing and shipment, such that after the fruit has started on its journey it can be delivered to the best market, wherever that market happens to be. These associations have been formed and work out their own problems much as your Planters' Association is doing. The relations of the railroads in connection with these associations are interesting. The Santa Fe for example has always reached out and given new industries every possible assistance. Some other railroads have an Industrial Commissioner who works with the Fruit Growers' Associations, instructs them about shipping and packing and helps to build up the territory along the line by getting men, telling them why the fruit did not come through in good shape and helping them to keep the cost down. Whatever can be done to bring the fruit trade

of the islands into close touch with the industrial commissioners of the mainland railroads is to be encouraged. I am sure that it would be a great help to the industry.

It is the little things that the farmer seems to know nothing about, but which insure success or failure. The man that receives the fruit may be able to tell him a great many things to his advantage. For example with the potatoes, the average farmer tries to raise a big potato. The market man says no; we want them of smaller uniform size and standard quality.

TYPE OF SETTLERS NEEDED.

The type of settler that seems to be needed in Hawaii is the man who is not absolutely dependent for immediate support on his farm, but who wants to have a place to live away from the city and where he can raise enough to support his family and then sell anything that is in excess. There are many such and it should be possible to bring a few of these people this way. Many inquiries come to my office from such men who are looking for a good location. Most of them are poorer, but many say they have ten thousand dollars or so, that they are tired of a cold climate and long winters, and are anxious to locate in a desirable place where they can raise fruit. In helping to place such people my office has practically become a Bureau of Settlement Inquiry. Now, I would like, if possible, to enlarge and strengthen that Bureau of Settlement Inquiry by including the Hawaiian Islands—telling men what they can and cannot do and pointing out to them the advatages and disadvantages of living here. If we could get a few of these men here every month it would be of great advantage to the Territory, for they are men that would appreciate this country. Each one that came in that way would, in time, be likely to bring as well some of his relatives or neighbors.

Between the sugar lands and the forest there are places which will be available for use when the leases run out in the next few years. These lands could be irrigated in part at least, and subdivided into small tracts for homesteads. With the expenditure of from one million to five million dollars water could be brought out from the mountains and certain lands developed for the men who would make a home on them and start in the diversified industries.

HAWAII'S SUPERIOR OPPORTUNITIES.

Viewing it from the standpoint of the West, the opportunities here are superior to many that have been taken up in the West; in the Western States we are spending twenty to

sixty dollars an acre in reclaiming the land, disposing of it as homesteads. It is on this land that men are supporting families by raising beef, vegetable products, etc., and are building up the State.

In the Kohala mountains large investments in developing water have already been made by private means. But there is still much water going to waste. If this were collected, together with the flood water in the small streams that now go to waste above Kawaihae, it might be used to irrigate the land of Waimea. Comparing it with problems in the States the opportunity looks good. Of course, all these things require careful investigation, and results can only be had after study on the ground.

Already some work of this kind has been done by the Bishop Estate. Water investigations cost a great deal of money, but it is a good investment and one which the Government should undertake. The first thing to be done is for the Territory to make these investigations, and if the Federal Government can help so much the better. The amount of water that goes to waste far exceeds the amount that is utilized. The first problem is to pick up the water on the highlands and to keep it at high elevations and then to use the power developed by dropping it to lift water further down the stream and return it to the land to be irrigated.

WHAT HAWAII SHOULD DO.

If the Territory could make a small appropriation contingent on the expenditure of a like amount by the Federal Government, results could be obtained much sooner than when everything is left to the Government. The appropriation of even a small amount by the Territory shows the members of Congress and the officials in Washington that the people here appreciate the work enough to put up money of their own.

On the mainland in irrigation works where private land is developed the Reclamation Service enters into an agreement with the private owners to the effect that their land will be reclaimed as part of the whole system on condition that after the water has been brought to the land they will dispose of it in small tracts to actual settlers. A similar scheme could be worked out here to the mutual advantage of the Government and the private owner.

A further point is that an appropriation by the Federal Government would be much more likely to attract the favorable attention of desirable settlers than if the development was simply in island affair. The fact that the Federal Government had undertaken the work or coöperated in it would give the people confidence. Whenever a new reclamation project is undertaken the newspapers are interested and the magazine

and other writers come to the Reclamation Service for information and photographs. The Service furnishes them with pictures and information in regard to the project which these men write up. It is good advertising and accomplishes more than would the expenditure of thousands of dollars for paid advertisement.

HAWAII'S ADVANTAGES NEED PUBLICITY.

As a matter of fact we must not forget that the American people have not yet discovered that Hawaii is a Territory. No man comes to the islands without feeling the most intense pleasure in the islands and the people. The question is how to get more people to come here. As soon as the people learn of the Islands they are coming here, and are coming to live. But we want men who have money enough to live comfortably for several years while they are getting established here and who will not have to struggle while waiting for returns to come in. There are many of the best kind of citizens going to Canada to take up those wheat lands. They have money to start with, but they are going out of their own country. Many of them would be glad to come back, but they do not know where to go. The problem is to let these men know where and what they can do in another part of the United States, and that the Federal Government is interested in seeing them well established.

In all reclamation work the Government does not give anything; it invests money with the expectation of getting every cent of it again. But as so much of the work has to be done on a very large scale and in such a way that money cannot be returned until after a long period of time, it is a problem which only the Federal Government can handle. For this reason the Federal Government is the only one that can undertake the reclamation of such lands.

NITROGEN FROM THE ATMOSPHERE.

The atmosphere surrounding our planet consists principally of a mixture of Nitrogen and Oxygen; about four-fifths of its volume is Nitrogen.

Nitrogen is perhaps the most elusive element of all, and owing to the fact that the supply of fixed nitrogen is limited, it is the most expensive constituent of fertilizers. Although quite as necessary to vegetation as carbon or oxygen—which also exist in the atmosphere, and which are readily acquired by all plants—all plants do not possess the power of acquiring nitrogen from this source. This power seems to be confined only

to the leguminous family; all other plants are dependent solely upon the soil for their nitrogen requirements.

In view of the wonderful progress made in the fixation of atmospheric nitrogen during the last few years and considering its vast importance to agriculture, it may be of interest to readers of the Planters' Monthly to give a short treatise on the manufacture and use of the various products so far successfully introduced for fertilizing purposes.

The enormous store of gaseous nitrogen present in the air has long been known and many attempts have been made to render this source available to agriculture, but it remained for the present generation to discover practicable methods.

A great many methods for the fixation of atmospheric nitrogen have been proposed but only two have so far proved a commercial success: the Cyanamide, or Lime-Nitrogen process, and the separation of nitrogen from the air by means of high tension electric discharges. Both of these methods have already been sufficiently perfected so as to make their commercial exploitation possible on a large scale and their products are already successfully competing with Nitrate of Soda and Sulphate of Ammonia on the European markets.

Not very long ago the ultimate exhaustion of the Chilean Niter beds (according to experts within from 20 to 30 years) was looked at with fear of dire consequences to agriculture, but science has conquered and we are today standing on the brink of a new era as regards the nitrogen supply for agricultural purposes. The methods so far discovered are perhaps only the forerunners of further great developments, which may yet revolutionize fertilization and the fertilizer industry.

NITRATE OF LIME.

As early as 1781 Cavendish made the discovery that Nitric Acid could be produced from the nitrogen of the air by the use of electricity, but not until the following century was this great discovery sufficiently perfected as to make practical application possible. Sir James Dewar, in 1880, determined that one kilowatt produced about 20 grains of nitrous acid. Later, in the year 1892, Sir William Crookes, by experiments made before the Royal Scientific Society of London, demonstrated that nitrogen when in contact with air was converted into Nitric Acid as well as Nitrous Acid, through the medium of the discharge of a powerful induction current.

Simultanously experiments were carried on by two French scientists of Marseilles, Perot and Coupier, in the fixation of atmospheric nitrogen by means of electrical discharges in the open air. An alternating current of several thousand volts was employed and as much as 790 pounds per year of Nitric Acid were produced per kilowatt.

Lord Ravleigh, in 1897, was able to increase the output to 965 pounds per kilowatt per year.

On the basis of these results, the "Atmospheric Product Company" was formed in 1902. A factory was built near the Niagara Falls, which was to use electric power produced at the falls, but in 1904 it suspended operations, the process proving a failure. Others followed with similar results until a Norwegian Professor "Christian Birkeland," assisted by Samuel Eyde, an engineer, had constructed a special electrical furnace in which they placed a specially constructed arc light.

An alternating current of 5000 volts was used and the discharge, through the singular influence of an electromagneto, takes place in the shape of a large disc, thereby considerably increasing its efficiency by presenting a larger surface to the air. The air passed through these furnaces takes on a reddish color and contains from one to two per cent. of nitrous fumes.

The first factory to apply these inventions was built in Notodden, Norway, in 1905, and has been in successful operation ever since. Apart from Nitric Acid for chemical and commercial purposes, Nitrate of Lime, a nitrogenous fertilizer containing about 13 per cent of nitrogen, is manufactured, a material easily soluble in water. A second factory is now in course of construction in Germany.

European Experiment Stations were not slow in recognizing the great importance of this material for agriculture, and fertilizing experiments in comparison with Nitrate of Soda, Sulphate of Ammonia and other nitrogenous materials were immediately instituted. In nearly all cases Nitrate of Lime was found to be fully equal to Nitrate of Soda; on soils poor in lime it even showed better results. In consequence thereof, Nitrate of Lime has already established itself as one of the regular fertilizing materials on the European markets.

LIME-NITROGEN.

This is a German process, patented by Prof. Frank and Dr. Caro, and consists of a treatment of Calcium Carbide with nitrogen. The product is often called Calcium Cyanamide, but also Nitrogen-Lime and Lime-Nitrogen. A factory for the exploitation of this process is in operation in Piano d'Orta, Italy, and its production has gradually been increased from 4000 to 14.000 tons annually. Another factory has been recently put into operation at Westeregeln, Germany, where an improved Frank-Caro process is employed. The product of this factory is known as Nitrogen-Lime and finds a ready sale.

The materials manufactured under the Frank-Caro process contain about 20 per cent nitrogen and 45 per cent lime. Calcium Carbide is heated in hermetically closed retorts to a red or white heat, nitrogen being now passed over it, is readily ab-

sorbed and enters into a chemical combination with the carbide, forming the Lime-Nitrogen. By passing ordinary air through retorts containing red hot copper, the oxygen is consumed in the oxidation of copper, resulting in the production of comparatively pure nitrogen, which is thereupon conducted to the carbide retorts. Lately, nitrogen has been produced from the distillation of liquid air. At Westeregeln this process has been improved by adding 10 per cent of Chlorate of Lime to the carbide.

Fertilizing Experiments with Lime-Nitrogen have also been carried on in Europe for sometime with more or less satisfactory results. Experience will gradually teach us how, where and when it is best applied, as negative results have mostly been attributed to errors made in the application, but there is no question that within a very few years this and the other identical products will become a very important factor in agriculture.

At all events, the apparent danger of the exhaustion of the Chilean Niter beds has now lost its acute form, as with the air to draw from, our supply of nitrogen is inexhaustible.

J. F. C. HAGENS.

TO SAVE THE PHOSPHATES.

The first tangible result from this session of the National Conservation Commission has been in favor of the agricultural interests of the country and the action in question is of widespread, national significance.

The report prepared for the Commission by the U. S. Geological Survey on the phosphate consumption and supply of the United States showed such a startling condition of affairs that vigorous steps were immediately taken by the Government, the President ordering the withdrawal from entry of the extensive area of phosphate lands recently discovered in the western States. The Geological Survey is engaged in the investigation and examination of mineral deposits, but in this instance its work has resulted in the adoption of provisions which are of vital concern to every farm and every farmer in the land. The description of the lands withdrawn, which are situated in Wyoming, Idaho and Utah, was furnished by the Survey as a result of a preliminary examination of the area, and further geologic work will be prosecuted as soon as practicable, in which the lands will be carefully classified and those found to be actually underlain with phosphate will be held, pending action by Congress.

At the present rate of production, it was stated, the known available supply of high grade phosphate rock in the United

States will last only about fifty years, and it was pointed out that a large proportion of this is exported for the benefit of foreign farm lands and at the expense of our own. While there is no method of preventing exportation from the eastern phosphate fields, it is believed to be possible to prohibit export of the western phosphates, since they are found largely on Government lands. This western field embraces the largest area of known phosphate beds in the world, and it is unquestioned that it is absolutely necessary to utilize these deposits solely for the benefit of the farms of the United States.

Phosphoric acid, as is of course well known, is one of the three substances which must exist in the soil to insure plant growth. President Van Hise, of the University of Wisconsin, stated that it had been shown as the result of agricultural experiment station work in Wisconsin, Ohio, and Illinois, that in 54 years certain cropped soils of those States have been depleted of one-third of their original phosphoric acid—1080 pounds or 20 pounds per acre annually. Applying this rate of exhaustion to the 400,000,000 acres of cropped land in the United States, it would require 12,000,000 tons of phosphate rock annually to merely offset the loss, or as much as the total amount which has been mined from the Florida deposits.

The rapid rate of increase in the domestic use of phosphate taken in connection with the limited supply is a matter sufficiently serious; but the feature which should arouse the greatest concern and call forth the most vigorous protest is the exportation of nearly half the output. From this exportation the United States received practically no benefit, whereas every pound of American phosphate is needed for American farm lands. The following figures show the steadily increasing production of phosphate rock in the United States::

Year	Tons
1890	510,499
1900	1,491,216
1905	1,947,190
1907	2,265,343

Of the 1907 production, 900,000 tons or about 40 per cent was exported.

The phosphate rock of South Carolina is nearly exhausted, and the Florida deposits, once popularly considered practically inexhaustible, have reached their maximum production. They will soon begin to decline. Tennessee has comparatively large deposits, but this field alone would at the present rapid rate of increase in production, last only, according to the government geologists, eleven years. There is some phosphate rock in Arkansas; but it is of low grade. The large deposits, therefore, of the Public Land States must furnish the most of the

phosphate of the future, and to insure the enrichment of our own soil from our own phosphate beds some methods must be devised to prevent the profitable business of its exportation.

This, it is believed, can be done only by the Government's retaining title to the public lands underlain with phosphate and providing for their development by leasing under terms which will forbid exportation. The lands have therefore been withdrawn by the Secretary of the Interior, as an emergency measure, and will be reserved pending action by Congress.

SUGAR GROWING IN JAVA.

In a recent number of the Philippine Agricultural Review Mr. R. L. Clute, of the Bureau of Agriculture, gives a brief account of a visit to Java for the purpose of studying agricultural conditions in that country. His description of a sugar estate at Tymol is as follows:

The sugar estate I visit at Tymol is said to the largest and most modern one in Java.

The only land owned by this sugar company is the building site for the mill and that occupied by the houses of the Dutch employees. The other land belongs to the Javanese. Each man who belongs to the community owns one or more rice paddies. When a company desires to start a sugar plantation in a certain locality it must first get permission from the Dutch Government. Permission must then be secured from the native chief or headman of the immediate district, and finally the land is rented from the individual Javanese. I inquired what was done if the individual landowner refused to rent his land, and was told that a deep ditch was dug around his paddy so that he could get no water for irrigation. It is probable that this laborer and his family would also be refused employment on the sugar estate. These conditions are, however, very rare, as all desire the rent money and an opportunity to work on the estate.

Only one-third of the total area of land in any given community can be planted to sugar at one time, the remaining two-thirds being planted in rice, peanuts, soy beans, sweet potatoes, or corn. In many fields the rice is harvested, the land irrigated to make it soft, and the peanut seeds are dropped into a hole made by a blunt stick, without replowing the soil. The sugar planter prefers a rice crop to precede sugar, as the soil is then free from weeds.

Sugar cane is grown for seed on a small plantation located in the highlands. This arrangement is very necessary to prevent the stock from deteriorating. Seed from this highland plantation is taken to the lowland estate and planted 3 feet apart

in rows in a nursery bed, where it grows from January until May, when planting begins. The young plants are then pulled. The lower ends of the stems are cut with a slanting stroke and search made for a certain disease, the presence of which is shown by many red specks located especially at the joints. If several joints are affected the stock is discarded, but if only one joint is slightly affected it is used. This disease causes considerable reduction in the percentage of sugar in the cane.

In the seed bed, cane is planted 3 feet apart, but in the field 5 feet apart. The soil is well trenched by hand labor. Long ditches, both for drainage and irrigation, extend in parallel rows from the higher to the lower side of the fields. These ditches are about 25 feet apart and 3 feet deep. During the rainy season the drainage ditches are cleaned after every rain. Rows of sugar cane extend from one drainage ditch to another. Trenches are dug in which the cane is planted. These trenches are about 2 feet deep and 2½ feet wide. The trenches are left open for a month or more so that the soil is thoroughly aerated, and the weeds are all carefully pulled. A small amount of peanut meal is first scattered in the bottom of the trench and is covered with about a 6-inch layer of loose soil. The sugar cane is planted end to end, and pressed in the soil, the buds being at the side. A little soil is then thrown on top of the cane and sprinkled with water from the trench ditches. An extra joint of cane is planted at the end of each row to replace any that fails to grow. As the shoots appear the trench is carefully filled until it is higher than the ground between the rows. The stem is thus started more than 1 foot below the surface of the soil. As the shoots multiply the soil is crowded between them. If there is no rain for a day all of these short rows are hand sprinkled. At the time of harvest the soil is dug and each stem is pulled, no cane being left in the field. Harvesting is done by gangs of laborers, each gang being paid according to the amount of work done.

The cane is carried by hand a short distance and placed on cars. Portable tracks are placed wherever harvesting is being done. Two carabaos hitched together with a yoke pull the loaded cars to the mill. The cane is hauled to the mill the same day that it is cut, and it is ground the following night and next day. The harvesting season lasts for about seven months, beginning in May, and during this time the work at the sugar mill is carried on night and day, the men working in eight-hour shifts.

The cane contains a maximum amount of sugar at a certain age and should be harvested at that time. In order that the cane may be maturing as the harvesting progresses, planting continues throughout the harvesting season. Some varieties of cane mature in twelve months, others in fifteen months.

All labor on the plantation, except in the sugar mills, is

paid for by the piece. The prices are so arranged that men can not earn much over 15 cents and women over 12 cents per day. The head boss of each gang receives money daily to pay his men. The men know how much money should be paid for doing a certain piece of work and how much their portion should be. The laborers are paid each evening; this pay system seems to be very satisfactory.

Since only one-third of the lands adjoining are planted to sugar two-thirds of the total are left for the Javanese. The plantations rent for a period of 23 months, which is just sufficient time to plant and harvest a sugar crop. At other times the Javanese plant such crops as best fit the land for a future crop. On the plantation I visited 24,000 acres are planted annually. A refining machine has recently been added to the equipment of this plantation, and a fair grade of granulated sugar is now produced. During nine months of 1906 Java exported 1,500,000,000 pounds of sugar, and during the same period the exports of sugar from the Philippine Islands were about 150,000,000 pounds.

At Klatten I visited a large sugar and tobacco estate. The manager of this estate is an expert chemist, having studied two years at Columbia University, New York. This estate includes 200,000 acres of land and 60,000 Javanese live on it. On certain fields tobacco was planted, followed by four crops of rice. Tobacco and sugar cane were never grown on the same field. A large pumping station was just being installed to supply water for irrigation.

Peanut meal and sodium nitrate are used as fertilizers for the sugar crop.

At the time of my visit, which was about May 2, the sugar was not ready for harvest, and it was too early for planting tobacco. The people were all gathering rice, after which the soil was broken for tobacco.

Ten Javanese boys are being instructed in the chemistry of sugar. After the ten months' course the more apt ones are to be given employment as sugar testers in the mills.

There are several sugar mills on the estate, the largest one producing 100 tons daily. It requires thirty-six hours to obtain granulated sugar from the cane.

I asked the manager what he considered the most difficult problem. He replied that the growing of the cane was the only great question. Mills can be erected in a few months and there is no difficulty in securing plenty of sugar makers.

EXPERIMENT STATION NOTES.

In the annual report of the Office of Experiment Stations, there are short accounts of the work of each of the Experiment Stations located in the various states and territories, and the notes of those engaged in sugar work are of general interest.

The work of the Louisiana stations has continued to prosper. Few changes in personnel have taken place, and at each station there has been a consistent development of the scope and scientific aspects of the work.

At Audubon Park interest has centered chiefly around problems connected with the growing of sugar cane and the manufacture of sugar, but some attention has also been given to forage crops, fiber investigations, and fruits and vegetables. Some important studies have been inaugurated, in part under the Adams Act, on the sugars and nonsugars occurring in sugar cane and as to the effect of sulphur dioxid in bleaching cane juice and the changes occurring in the sulphur compounds remaining in the products. A study of the effect of Louisiana sirups on the human system was carried on with negroes in which molasses containing as much as 900 milligrams of sulphur as sulphites per kilogram was consumed without apparent injury. In the work of cane improvement the station, with the assistance of the New Orleans Park Commission, has succeeded in producing over 100 seedling canes from seed received from the Tropics, some of which have made remarkable growth. A considerable number of types and varieties of cane are being grown to test their yield, purity of juice, and other characteristics, and one variety introduced and tested by the station has proved so well adapted to local conditions that it is now planted to a greater extent throughout the State than all other varieties combined. Experiments are also being carried on to test the value of different parts of the cane stalk and of first and second rattoon crops for general planting.

The Porto Rico Station has again prosecuted its activities along two general lines—the developing and improving of economic crops already grown in the island and the introduction of crops which promise to be of financial value—and in each material progress is reported. Attention has been paid to the leading crops of the island, sugar, coffee, tobacco, citrus fruits, pineapples, etc.

Experiments with sugar cane have included methods of culture, fertilizing, and plant breeding. The breeding work has been very successful, canes having been grown at the station with nearly double the average sugar content for the island. Some of the more desirable seedlings have been dis-

tributed to planters by whom the work is much appreciated. One of the largest sugar companies is actively coöperating in the breeding work, contributing the services of two men for the purpose. A number of leguminous crops are also under trial as green manures to follow sugar cane with the idea of offsetting the injurious effects of continuous culture.

INTERNATIONAL CONGRESS OF APPLIED CHEMISTRY.

All persons interested in the industry and chemistry of sugar are urgently invited to become members of Section 5 of the Seventh International Congress of Applied Chemistry to be held in London, May 27, to June 2, 1909. The published Proceedings of this Congress will be furnished free to all members and will be found to constitute a considerable chemical library. The proceedings of the Fifth Congress (Berlin 1903), formed 4 volumes containing articles by experts upon all branches of Applied Chemistry; the sugar section of these Proceedings comprised 470 pages with 45 papers in English, French, and German. The Proceedings of the Sixth Congress (Rome 1906) numbered 7 large volumes of which 447 pages were devoted to sugar with 48 papers in English, French, German, and Italian. The Proceedings of the next London Congress will no doubt exceed all previous ones in the quality and quantity of chemical knowledge supplied.

American chemists having anything interesting or original to report upon the chemistry and technology of sugar are asked to help in the work of the Congress by making it the subject of a paper. Such papers should be neatly typewritten upon thin paper and sent to Dr. Browne, 80 South Street, New York, Chairman of the undersigned Sub-committee, not later than April 1, in order that they may be indexed and forwarded for publication before the Congress opens.

The subscription price for membership in the Congress has been fixed at one pound, but to cover the cost of postage, etc., it is suggested that each subscriber send $5.00. Subscriptions should be sent to Dr. H. W. Wiley, Bureau of Chemistry, Washington, D. C., Chairman of the American Committee, who will forward the same promptly to London.

We hope there will be a large response to this invitation as it is desired to have the American Branch of the Congress well represented, both in membership and contributions. Whether it is possible to attend the meetings of the Congress

or not the published Proceedings will be found to be worth vastly more than the fee for membership and will prove invaluable to those desiring to keep up with the progress of matters relating to the industry and chemistry of sugar.

C. A. BROWNE, Chairman;
A. HUGH BRYAN,
DAVID L. DAVOLL,
HUBERT EDSON,
WM. D. HORNE,

Sub-committee Section 5 Industry & Chemistry of Sugar.